OBSERVATIONS & RECOMMENDATIONS

After reviewing data collected from **TUREE POND** the program coordinators recommend the following actions.

FIGURE INTERPRETATION

- Figure 1: These graphs illustrate concentrations of chlorophyll-a in the water column. Algae are microscopic plants that are a natural part of lake ecosystems. Algae contain chlorophyll-a, a pigment necessary for photosynthesis. A measure of chlorophyll-a can indicate the abundance of algae in a lake. The historical data (the bottom graph) show a *fairly stable* in-lake chlorophyll-a trend. The chlorophyll concentration was quite low in May, and was only slightly elevated in July and September. The mean chlorophyll-a concentration was well below the New Hampshire mean this year. The July plankton sample contained two species of blue-green algae, *Anabaena* and *Coelosphaerium*, however these were not the most dominant. Overall, algal abundance remains low. While algae are present in all lakes, an excess amount of any type is not welcomed. Concentrations can increase when there are external and internal sources of phosphorus, which is the nutrient algae depend upon for growth. It's important to continue the education process and keep residents aware of the sources of phosphorus and how it influences lake quality.

- Figure 2: Water clarity is measured by using a Secchi disk. Clarity, or transparency, can be influenced by such things as algae, sediments from erosion, and natural colors of the water. The graphs on this page show historical and current year data. The lower graph shows a *stable* trend in lake transparency. Both inlets were dry during the July sampling event, which may have reduced the sediment and phosphorus load into the pond, making it less turbid. Mean transparency was again below the state mean. The 2000 sampling season was considered to be wet and, therefore, average transparency readings are expected to be slightly lower than last year's readings. Higher amounts of rainfall usually cause more eroding of sediments into the lake and streams, thus decreasing clarity.

- Figure 3: These figures show the amounts of phosphorus in the epilimnion (the upper layer in the lake) and the hypolimnion (the

lower layer); the inset graphs show current year data. Phosphorus is the limiting nutrient for plants and algae in New Hampshire waters. Too much phosphorus in a lake can lead to increases in plant growth over time. These graphs show a *slightly improving* trend for in-lake phosphorus levels. Both layers' mean phosphorus concentrations fell below the New Hampshire median this year. This was the first year that the epilimnetic average was below the reference line. In fact, the mean phosphorus concentration in both layers was the lowest since Turee Pond joined the VLAP program. Maintaining this trend will help keep nuisance algae under control and make the pond more recreationally and aesthetically pleasing. One of the most important approaches to reducing phosphorus levels is educating the public. Humans introduce phosphorus to lakes by several means: fertilizing lawns, septic system failures, and detergents containing phosphates are just a few. Keeping the public aware of ways to reduce the input of phosphorus to lakes means less productivity in the lake. Contact the VLAP coordinator for tips on educating your lake residents or for ideas on testing your watershed for phosphorus inputs.

OTHER COMMENTS

- Conductivity levels were slightly increased from last year's results at the Stream 1 sites this year (Table 6), although levels have been higher in the past. The stormwater samples that were collected in April were included in this year's tables, and may have contributed to the higher mean conductivity. However, the stormwater samples were not the highest conductivity levels of the season. This summer was rainy and any pollutants that might have been present in the watershed would likely flush into the streams.

- Site 2A also had higher conductivity levels this summer (Table 6), but this site was only sampled twice, due to dry conditions at the site. The conductivity levels have not returned to the high concentrations observed in the past. Site 2B experienced lower conductivity levels this year, and the average was the lowest observed since the sampling of Turee Pond began in 1996. We are pleased with this result and hope the conductivity values will continue to decrease.

- In-lake conductivity declined as well this year, although the levels remain quite high. The higher water levels may have reduced the concentration of salts and minerals in the pond.

- **Please note** on one occasion this summer the phosphorus levels at sites 1A, 1C, and 2B were recorded as less than 5 µg/L. The NHDES Laboratory Services adopted a new method of reporting total phosphorus this year and the lowest value that can be recorded is 'less than 5 µg/L'. We would like to remind the monitors that a reading of 5 µg/L is considered low for New Hampshire's waters.

- The mean total phosphorus concentrations at sites 1A and 1B were slightly elevated this summer (Table 8), while the 1C average was reduced drastically. The high reading for 1C on July 19th was accompanied by a high turbidity reading, which indicates sediment in the sample. The site had fairly low water at the time. The increases at the other Stream 1 sites were not excessive and will likely revert to the lower concentrations previously observed.

- The total phosphorus at site S1 (the wet weather-only site) was reduced by half from last year's reading, however it remains in the excessive range for New Hampshire's waters. The reduction is promising, and indicates the construction sites may be stabilizing.

- Dissolved oxygen was high throughout the water column (Table 9). Shallow ponds tend to mix continuously through wind and wave action, thereby allowing for oxygen exchange with the atmosphere.

- The spring stormwater sampling event occurred in April this year. The results of the analyses are in Table 13. The chloride levels at every site were below last year's results, with site 2B again having the highest concentration. The nitrate levels were less than last year's results at Inlet 1, while the other sites' results were only slightly higher. Phosphorus levels were slightly elevated from last year's results at sites 1A, 1B, 2A and 2B. Please remember to conduct a second stormwater sampling event during the fall months.

NOTES

- Monitor's Note (4/4/00): Site 1A sample contained sediment.

- Monitor's Note (5/4/00): Black ducks, mallard ducks, fish.

- Monitor's Note (7/19/00): 1A and 2A dry, no flow.

- Monitor's Note (9/17/00): Blue heron, black ducks, hawk. Tributary flow minimal, no recent storms, dry conditions at the pond.

USEFUL RESOURCES

What Can You Do To Prevent Soil Erosion?, WD-BB-30, NHDES Fact Sheet. (603) 271-3503 or www.state.nh.us

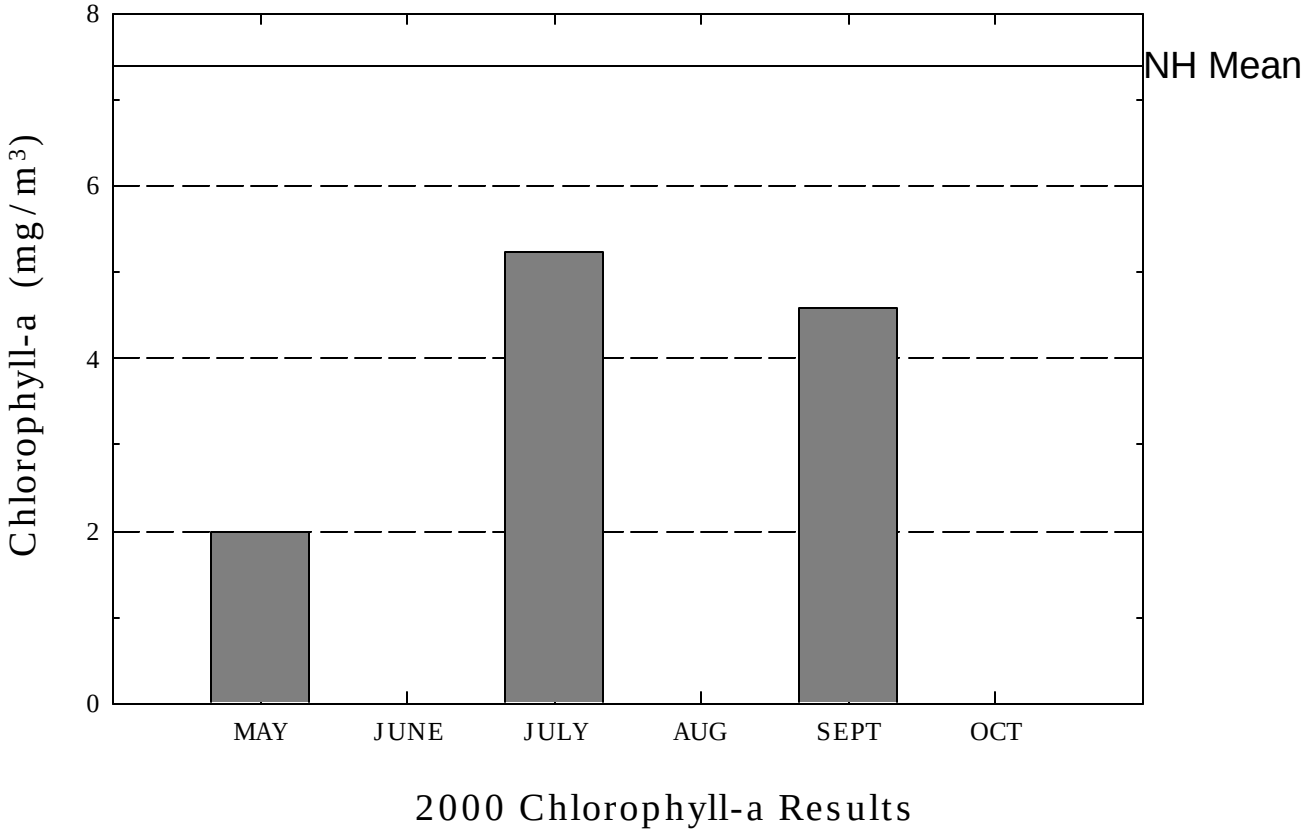
A Brief History of Lakes, NH Lakes Association pamphlet, (603) 226-0299 or www.nhlakes.org

Answers to Common Lake Questions, NHDES-WSPCD-92-12, NHDES Booklet, (603) 271-3503.

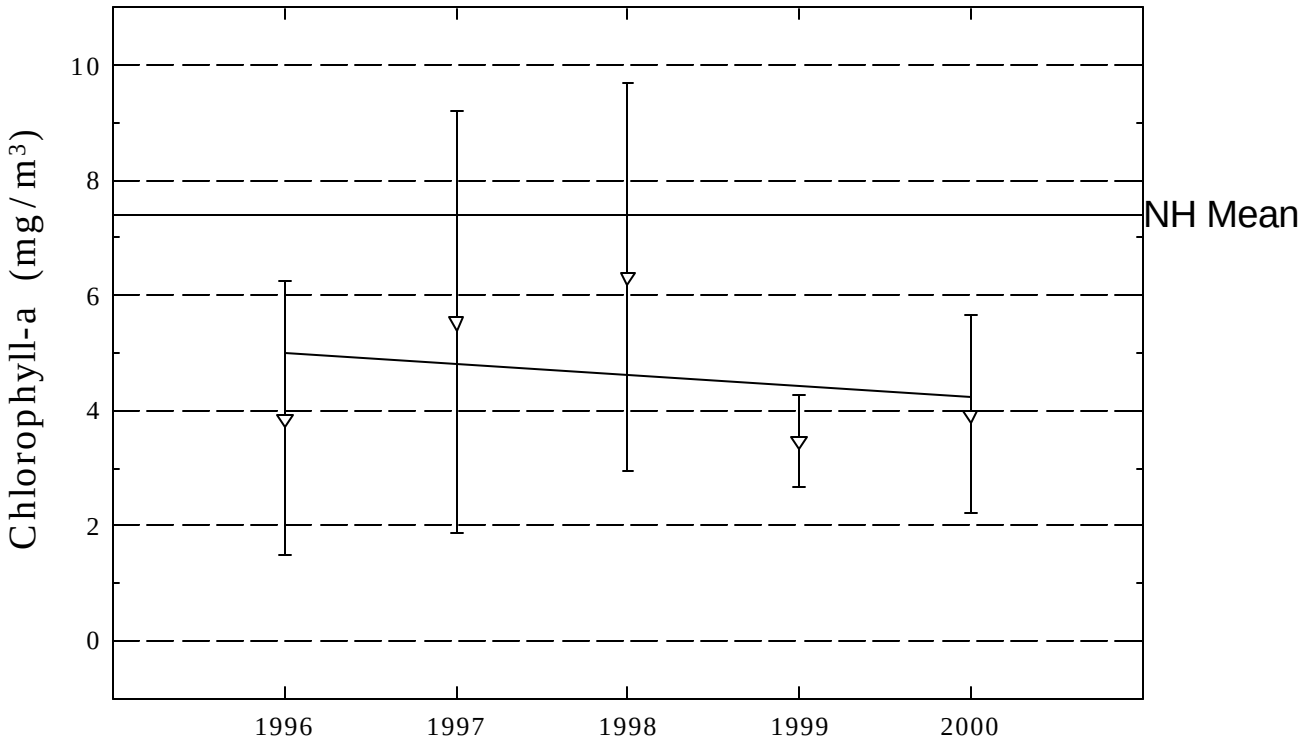
Anthropogenic Phosphorus and New Hampshire Waterbodies, NHDES-WSPCD-95-6, NHDES Booklet, (603) 271-3503

Turee Pond

Figure 1. Monthly and Historical Chlorophyll-a Results



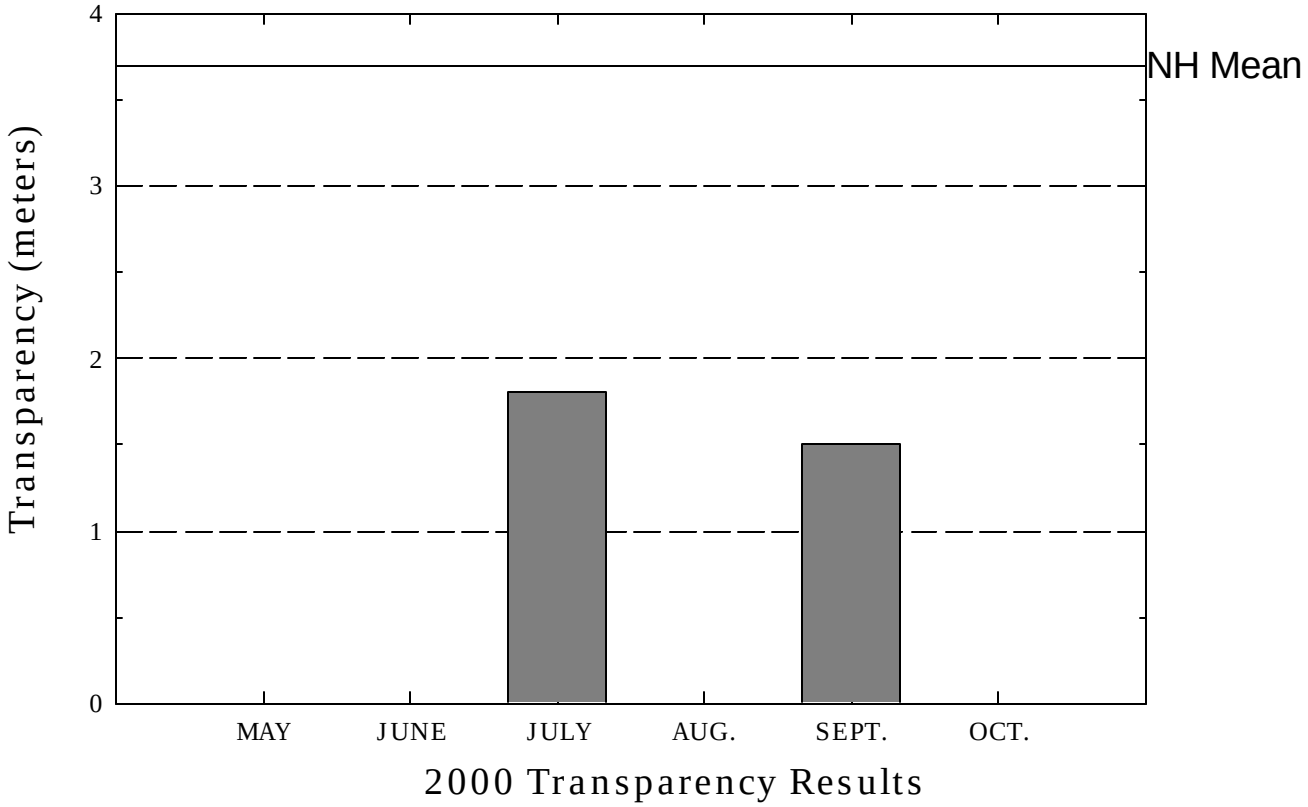
2000 Chlorophyll-a Results

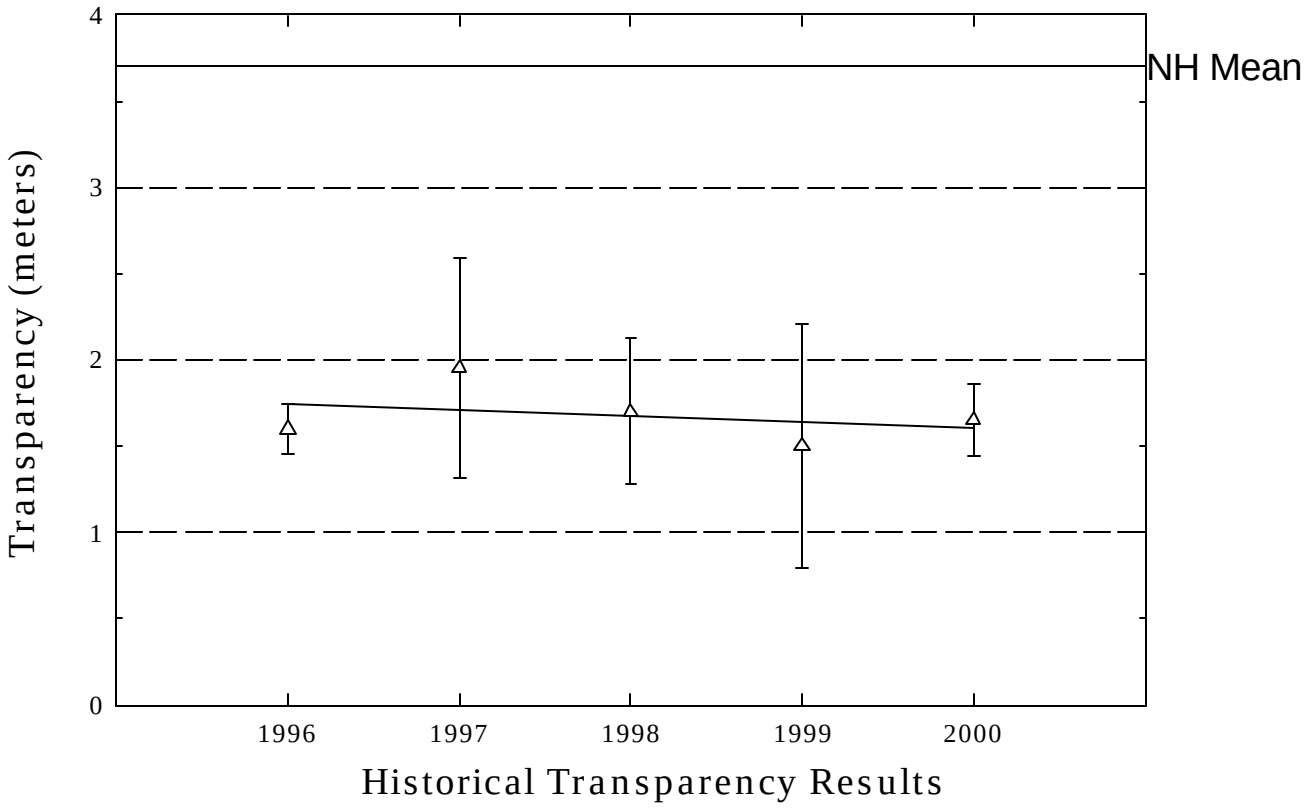


Historical Chlorophyll-a Results

Turee Pond

Figure 2. Monthly and Historical Transparency Results





Turee Pond

Figure 3. Monthly and Historical Total Phosphorus Data.

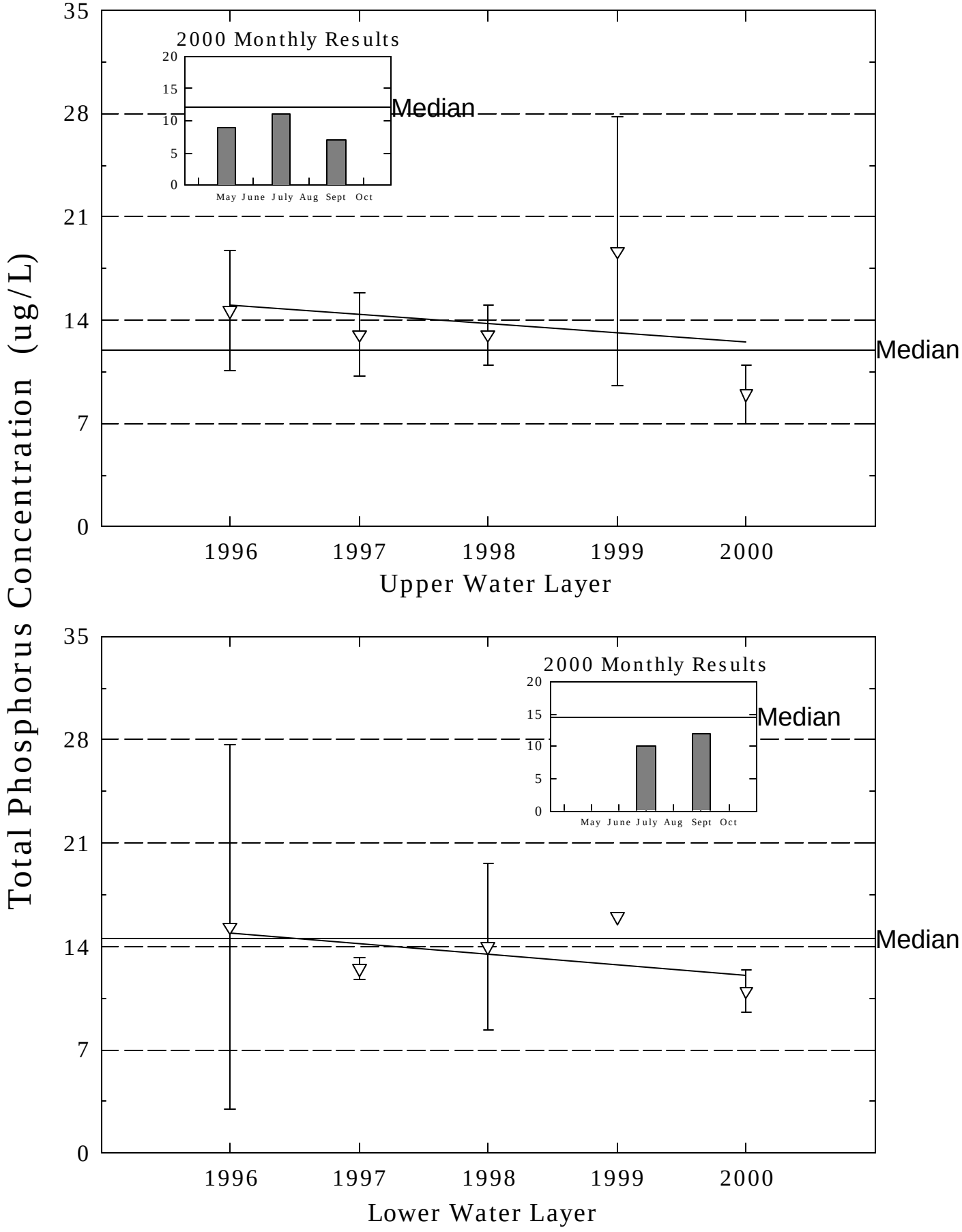


Table 1.

TUREE POND

BOW

Chlorophyll-a results (mg/m^3) for current year and historical sampling periods.

Year	Minimum	Maximum	Mean
1996	1.49	6.26	3.85
1997	2.56	9.65	5.54
1998	3.08	9.83	6.32
1999	2.56	4.03	3.47
2000	1.99	5.24	4.09

Table 2.

TUREE POND

BOW

Phytoplankton species and relative percent abundance.

Summary for current and historical sampling seasons.

Date of Sample	Species Observed	Relative % Abundance
05/09/1996	DINOBRYON	74
	PINNATE DIATOM	7
	TABELLARIA	5
07/31/1996	SYNURA	43
	DINOBRYON	26
	ANABAENA	5
09/30/1996	DINOBRYON	78
	PLEUROSIGMA	7
05/30/1997	DINOBRYON	78
	UROGLENOPSIS	13
	GYMNODINIUM	5
07/25/1997	DINOBRYON	89
	RHIZOSOLENIA	7
	ANABAENA	2
09/30/1997	ANABAENA	57
	DINOBRYON	13
	CHRYSOSPHAERELLA	12
05/26/1998	DINOBRYON	63
	ANABAENA	23
	MALLOMONAS	8
07/30/1998	COELOSPHAERIUM	45
	CERATIUM	38
	MALLOMONAS	7
09/29/1998	DINOBRYON	76
	SYNURA	11
	MALLOMONAS	7
05/20/1999	ANABAENA	56
	MALLOMONAS	27
	CERATIUM	9
08/04/1999	CHRYSOSPHAERELLA	79
	RHIZOSOLENIA	12
	DINOBRYON	3

Table 2.

TUREE POND

BOW

Phytoplankton species and relative percent abundance.

Summary for current and historical sampling seasons.

Date of Sample	Species Observed	Relative % Abundance
10/06/1999	PENNATE SP.	34
	MALLOMONAS	24
	CLOSTERIUM	18
07/19/2000	CERATIUM	36
	MALLOMONAS	23
	ANABAENA	12

Table 3.

TUREE POND

BOW

Summary of current and historical Secchi Disk transparency results (in meters).

Year	Minimum	Maximum	Mean
1996	1.5	2.2	1.8
1997	1.5	2.4	1.9
1998	1.4	2.3	1.9
1999	1.0	2.0	1.5
2000	1.5	1.8	1.6

Table 4.

TUREE POND

BOW

pH summary for current and historical sampling seasons.
Values in units, listed by station and year.

Station	Year	Minimum	Maximum	Mean
1A				
	1996	5.78	5.78	5.78
	1997	5.57	5.75	5.67
	1998	5.58	5.58	5.58
	1999	5.64	6.24	5.86
	2000	5.73	5.76	5.74
1B				
	1996	6.65	6.65	6.65
	1997	6.78	7.00	6.86
	1998	6.82	6.93	6.86
	1999	6.53	6.82	6.61
	2000	6.75	6.78	6.76
1C				
	1996	6.60	6.60	6.60
	1997	6.83	6.93	6.88
	1998	6.89	6.93	6.91
	1999	6.57	7.01	6.72
	2000	6.75	6.99	6.86
2A				
	1996	6.31	6.31	6.31
	1997	6.16	6.30	6.22
	1998	6.22	6.44	6.32
	1999	5.82	5.82	5.82
	2000	6.02	6.02	6.02

Table 4.

TUREE POND

BOW

pH summary for current and historical sampling seasons.
Values in units, listed by station and year.

Station	Year	Minimum	Maximum	Mean
2B				
	1996	6.43	6.43	6.43
	1997	6.50	6.65	6.58
	1998	7.11	7.11	7.11
	1999	6.36	7.09	6.60
	2000	6.54	6.62	6.59
EPILIMNION				
	1996	6.30	6.48	6.39
	1997	6.76	6.87	6.80
	1998	6.72	6.90	6.81
	1999	6.35	6.62	6.50
	2000	6.52	6.88	6.66
HYPOLIMNION				
	1996	6.27	6.54	6.40
	1997	6.59	6.80	6.70
	1998	6.56	6.69	6.62
	1999	6.73	6.73	6.73
	2000	6.33	6.69	6.53

Table 5.

TUREE POND

BOW

Summary of current and historical Acid Neutralizing Capacity.
Values expressed in mg/L as CaCO .

Epilimnetic Values

Year	Minimum	Maximum	Mean
1996	5.70	12.20	9.63
1997	6.50	10.50	8.87
1998	6.50	14.30	11.20
1999	6.60	10.60	8.43
2000	4.90	11.30	8.57

Table 6.

TUREE POND

BOW

Specific conductance results from current and historic sampling seasons. Results in uMhos/cm.

Station	Year	Minimum	Maximum	Mean
1A				
	1996	164.4	199.0	183.4
	1997	216.3	258.0	236.0
	1998	197.9	197.9	197.9
	1999	159.6	216.2	190.1
	2000	152.6	282.0	200.0
1B				
	1996	174.0	196.0	187.5
	1997	189.6	208.0	200.4
	1998	179.7	200.9	191.1
	1999	138.8	206.0	178.6
	2000	146.2	217.0	189.4
1C				
	1996	161.8	189.0	177.0
	1997	184.5	189.0	186.5
	1998	176.5	197.0	187.7
	1999	135.4	196.0	167.4
	2000	127.7	207.0	175.3
2A				
	1996	143.6	373.0	245.5
	1997	357.0	618.0	487.5
	1998	241.7	324.0	282.8
	1999	98.2	98.2	98.2
	2000	116.3	119.2	117.8

Table 6.

TUREE POND

BOW

Specific conductance results from current and historic sampling seasons. Results in uMhos/cm.

Station	Year	Minimum	Maximum	Mean
2B				
	1996	263.8	335.7	303.7
	1997	305.0	399.6	342.8
	1998	357.9	357.9	357.9
	1999	323.0	394.2	352.7
	2000	210.0	365.0	301.1
EPILIMNION				
	1996	201.0	245.0	219.6
	1997	216.2	262.0	240.0
	1998	169.4	195.3	185.5
	1999	202.8	243.2	222.8
	2000	156.7	216.0	190.9
HYPOLIMNION				
	1996	200.4	241.0	218.4
	1997	218.3	263.0	240.3
	1998	172.1	196.2	184.1
	1999	245.4	245.4	245.4
	2000	156.0	215.0	190.3
S1				
	2000	24.8	24.8	24.8

Table 8.

TUREE POND

BOW

Summary historical and current sampling season Total Phosphorus data. Results in ug/L.

Station	Year	Minimum	Maximum	Mean
1A				
	1996	3	5	4
	1997	0	10	5
	1998	3	3	3
	1999	1	15	7
	2000	< 5	27	12
1B				
	1996	6	11	8
	1997	8	16	12
	1998	6	7	6
	1999	6	12	8
	2000	5	24	11
1C				
	1996	5	22	12
	1997	7	30	16
	1998	2	6	3
	1999	8	154	64
	2000	< 5	46	16
2A				
	1996	8	20	15
	1997	23	36	29
	1998	5	8	6
	1999	19	19	19
	2000	12	15	13

Table 8.

TUREE POND

BOW

Summary historical and current sampling season Total Phosphorus data. Results in ug/L.

Station	Year	Minimum	Maximum	Mean
2B				
	1996	13	90	39
	1997	13	21	16
	1998	14	14	14
	1999	6	23	13
	2000	< 5	31	12
EPILIMNION				
	1996	11	19	14
	1997	11	297	107
	1998	11	15	13
	1999	12	29	18
	2000	7	11	9
HYPOLIMNION				
	1996	5	29	15
	1997	12	162	62
	1998	10	18	14
	1999	16	16	16
	2000	10	2580	867
S1				
	2000	119	119	119

Table 9.

TUREE POND

BOW

Current year dissolved oxygen and temperature data.

Depth (meters)	Temperature (celsius)	Dissolved Oxygen (mg/L)	Saturation (%)
		July 19, 2000	
0.1	22.4	7.1	81.5
1.0	22.4	7.1	81.5
2.0	22.4	7.1	81.2

Table 10.

TUREE POND

BOW

Historic Hypolimnetic dissolved oxygen and temperature data.

Date	Depth (meters)	Temperature (celsius)	Dissolved Oxygen (mg/L)	Saturation (%)
July 31, 1996	2.5	19.6	0.1	1.0
September 30, 1996	2.5	15.5	7.6	74.0
May 30, 1997	2.5	15.0	10.2	101.0
September 30, 1997	2.5	14.9	8.7	83.0
July 30, 1998	2.5	21.4	2.3	26.0
September 29, 1998	2.5	19.1	10.9	116.0
May 20, 1999	2.5	17.6	9.4	96.0
July 28, 1999	2.5	26.0	7.5	92.0
July 19, 2000	2.0	22.4	7.1	81.2

Table 11.

TUREE POND

BOW

Summary of current year and historic turbidity sampling.
Results in NTU's.

Station	Year	Minimum	Maximum	Mean
1A				
	1996	0.0	0.1	0.0
	1997	0.0	0.4	0.2
	1998	0.1	0.1	0.1
	1999	0.0	0.3	0.1
	2000	0.1	1.2	0.5
1B				
	1996	0.1	0.8	0.5
	1997	0.6	2.4	1.3
	1998	0.6	1.9	1.1
	1999	0.3	0.6	0.4
	2000	0.4	0.9	0.6
1C				
	1996	0.1	1.0	0.5
	1997	0.8	1.7	1.1
	1998	0.5	7.5	3.8
	1999	1.0	2.4	1.9
	2000	0.5	6.4	2.3
2A				
	1996	0.1	1.4	0.7
	1997	27.0	32.0	29.5
	1998	0.2	10.6	5.4
	1999	0.4	0.4	0.4
	2000	0.0	0.2	0.1
2B				
	1996	0.3	23.0	11.6

Table 11.

TUREE POND

BOW

Summary of current year and historic turbidity sampling.
Results in NTU's.

Station	Year	Minimum	Maximum	Mean
	1997	2.6	4.4	3.3
	1998	0.8	0.8	0.8
	1999	1.2	3.6	2.3
	2000	0.3	2.8	1.6
EPILIMNION				
	1996	0.5	0.5	0.5
	1997	0.6	1.0	0.7
	1998	0.6	1.5	1.1
	1999	0.6	1.0	0.8
	2000	0.5	0.6	0.5
HYPOLIMNION				
	1996	0.5	0.5	0.5
	1997	0.8	0.9	0.8
	1998	0.4	7.1	3.7
	1999	1.0	1.0	1.0
	2000	0.5	0.7	0.6
S1				
	2000	26.0	26.0	26.0